

What is claimed is:

- 1 1. A frequency hopping communications device for
2 transmitting signals on a plurality of M subcarrier
3 signals in parallel, each of said M subcarrier signals
4 corresponding to a different one of M subcarrier signal
5 frequencies, said M subcarrier signal frequencies being
6 a subset of N subcarrier frequencies on which said
7 communications device may transmit signals over time,
8 where $M < N$, said frequency hopping communications device
9 including:
 - 10 a frequency control circuit for controlling which
11 of the N subcarrier frequencies are used by said device
12 for the transmission of signals;
 - 13 a plurality of M separate subcarrier signals paths
14 operating in parallel, each of the M subcarrier signal
15 paths including a programmable signal generator coupled
16 to said frequency control circuit, a power
17 amplification circuit and a filter circuit, said
18 programmable signal generator for generating a
19 subcarrier signal having a subcarrier frequency
20 corresponding to said subcarrier signal path to which
21 said signal generator corresponds; and
 - 22 a combining circuit for combining analog
23 subcarrier signals corresponding to different
24 subcarrier signal paths prior to transmission.
- 1 2. The device of claim 1, wherein each of the M signal
2 filter circuits, that each correspond to a different
3 one of said M signal paths, is a fixed filter, at least
4 one of the M fixed filters having a passband bandwidth
5 at least equal to Y times the average frequency spacing

6 between the N frequencies that said device can use as
7 the N subcarrier frequencies, where Y is a positive
8 number greater than 1.

1 3. The method of claim 2, wherein $Y \geq N$ divided by M.

1 4. The method of claim 2, wherein Y is at least as
2 large as N.

1 5. The method of claim 2, wherein each of said M
2 signal filter circuits are identical fixed filters each
3 having a passband bandwidth covering the full set of N
4 subcarrier signal frequencies which may be used by said
5 device.

1 6. The method of claim 5, wherein the M subcarrier
2 signals are OFDM subcarrier signals and where the N
3 subcarrier frequencies are evenly spaced frequencies.

1 7. The device of claim 2, wherein the fixed filter
2 included on each of said M signal paths is positioned
3 in series with said corresponding power amplification
4 circuit either before or after the corresponding power
5 amplification circuit.

1 8. The device of claim 7,
2 wherein the programmable signal generator included
3 in each subcarrier signal path generates an analog
4 subcarrier signal; and
5 wherein said power amplification circuit and said
6 filter circuit included in each subcarrier signal path
7 are analog circuits.

1 9. The device of claim 1, wherein each of the M
2 signal filter circuits, that each correspond to a
3 different one of said M signal paths, is a programmable
4 filter.

1 10. The device of claim 9, wherein each of the M
2 programmable filters has a passband corresponding to
3 the subcarrier signal frequency of the subcarrier
4 signal generated by the programmable signal generator
5 circuit included on the same subcarrier signal path as
6 the programmable filter.

1 11. The device of claim 10, wherein the programmable
2 filters have a passband which has a bandwidth
3 sufficient to pass said subcarrier signal but reject
4 the nearest neighboring one, in frequency, of said N
5 subcarrier signals.

1 12. The device of claim 9, wherein said device further
2 transmits information using at least one additional
3 preselected subcarrier frequency, the device further
4 comprising:

5 an additional subcarrier signal path including an
6 amplifier and fixed filter for amplifying and filtering
7 a subcarrier signal corresponding to said additional
8 preselected subcarrier frequency.

1 13. The device of claim 12, where said additional
2 subcarrier frequency corresponds to a control channel
3 used to transmit control information.

1 14. A frequency hopping communication method for use
2 in a communications system wherein a device can
3 transmit information using M subcarrier signals at a
4 time, each of the M subcarrier signals corresponding to
5 a different subcarrier frequency, where M is less than
6 N and where N is the total number of different
7 subcarrier frequencies said device can use over time,
8 the method comprising:

9 i) operating M programmable signal generators
10 to generate said M subcarrier signals;

11 ii) separately processing each of the M
12 subcarrier signals to produce M processed subcarrier
13 signals, the processing of each of said M subcarrier
14 signals including a amplification operation and a
15 filtering operation, said separate processing thus
16 including M separate filtering operations; and

17 iii) combining the M processed subcarrier
18 signals to generate a frequency division multiplexed
19 transmission signal;

20 iv) controlling at least one of said M
21 programmable signal generators to change the frequency
22 of the subcarrier signal generated by said at least one
23 programmable signal generator; and

24 v) repeating steps (i), (ii), and (iii).

1 15. The method of claim 14, wherein said M subcarrier
2 signals are analog signals and wherein said filtering
3 operation is an analog filtering operation.

1 16. The method of claim 14, wherein said M separate
2 filtering operations are performed using M separate
3 fixed filters, at least one of the M fixed filters

4 having a bandwidth at least equal to Y times the
5 average frequency spacing between the N frequencies
6 that said device can use as the N subcarrier
7 frequencies, where Y is a positive number greater than
8 1.

1 17. The method of claim 16, wherein $Y \geq N$ divided by
2 M.

1 18. The method of claim 16, wherein Y is equal to or
2 greater than N.

1 19. The method of claim 15, wherein said M separate
2 filtering operations are performed using identical
3 fixed filters each having a bandwidth covering the full
4 set of N subcarrier signal frequencies which may be
5 used by said device.

1 20. The method of claim 19, wherein the N subcarrier
2 signals are OFDM subcarrier signals.

1 21. The method of claim 14, wherein said M separate
2 filtering operations are performed using M separate
3 programmable filters, the frequency of each of each of
4 the M programmable filters corresponding to the
5 frequency of the subcarrier signal being filtered.

1 22. The method of claim 14, further comprising:
2 changing the amount of power amplification
3 performed on one of the M subcarrier signals when the
4 frequency of said subcarrier signal is changed.

1 23. The method of claim 16, wherein controlling at
2 least one of said M programmable signal generators to
3 change the frequency of the subcarrier signal includes:
4 operating said M programmable generators to switch
5 from generating a first set of M subcarrier signals
6 corresponding to a first set of M uniformly spaced
7 subcarrier frequencies to generating a second set of M
8 subcarrier signals corresponding to a second set of M
9 uniformly spaced subcarrier frequencies, a first
10 subcarrier frequency in said first set of M subcarrier
11 frequencies being separated from a first subcarrier
12 frequency in said second set of M subcarrier
13 frequencies by a frequency spacing that is less than Y
14 times the frequency spacing between subcarrier signals
15 in said first and second sets of M subcarrier signals.